CHAPTER/REGIONAL TECHNOLOGY AWARD APPLICATION SHORT FORM

(Revised April 2012)

INTRODUCTION:

This Short Form has been developed to stimulate more participation in chapter and regional competition. ***This form is not intended to replace the full Society Technology Award Application form****. Regional winners using the short form will be required to complete the full Technology Award Application form before their applications can be forwarded for Society Competition. (This form does not require extensive narrative, plans or photographs.)*

INSTRUCTIONS:

A. The individual submitting the Technology Award Application must be a current member of ASHRAE who had a significant role in the design or development of the project.

B. Complete the "Short Form" and use it as the cover page.

C. Provide a system schematic/diagram not larger than 11" x 17" in size. In addition, attach a brief narrative (maximum of 2 pages). The narrative should include the gross and net building areas applicable to the project, a description of the major building areas (i.e.,operating rooms, laboratories, computer rooms, industrial processes, offices, warehouses) and a brief discussion regarding the following five criteria (if a criterion is not applicable, state accordingly):
   - Energy Efficiency
   - Indoor Air Quality
   - Innovation
   - Operation & Maintenance
   - Cost Effectiveness
   - Environmental Impact

D. Submit your schematic, brief narrative, and completed form to your Chapter Technology Committee Chapter (CTTC) Chair for judging at the chapter level in accordance with their instructions.

E. The ASHRAE Technology Award program is intended for built projects. First place winning projects should be eligible for submission to the Society level competition on September 1st of the following Society calendar year. Therefore, a project submitted to a Chapter or Regional competition shall be occupied prior to September 1st of the current Society year in order satisfy the proceeding Society level competition requirement of one full year of occupancy.

   First place winners in each category from chapter competition will be submitted by the CTTC Chapter Chair to the CTTC Regional Vice Chair for judging in the Regional Technology Awards competition. At the discretion of the CTTC Regional Vice Chair, this may require completion of the full Society Technology Award Application form if the chapter submission was done on the Short Form Application.

   The CTTC Regional Vice Chair will invite first place winners in each category from regional competition to submit them for judging in the Society level Technology Awards competition. The regional winners will be given the opportunity to incorporate new information or otherwise improve their submittal before submitting it to the society level competition (e.g., by addressing comments from regional judges). At the discretion of the judging panels at the chapter and regional competitions, more than one first place winner may be awarded in each category.

   For the regional competition, submit the number of copies requested by the Regional CTTC Vice Chair. The CTTC Regional Vice Chair may require entries into the regional competition to be done on the full Society Technology Award Application form. In any case, all submissions to the Society level competition must be done on the full Society Technology Award Application form.

F. It is highly recommended that each entrant confirm by letter (and retain a copy for record) to the owner that the owner has granted permission to submit this project to competition.

NOTE: ASHRAE Technology Awards are the HVAC&R industry's most prestigious honor for efficient energy use in buildings and environmental system performance. While the awards do not certify responsible charge or professional license status, they do recognize outstanding design innovation and successful implementation.

CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category (Check one and indicate New or Existing, if applicable)

○ Commercial Buildings	○ New or ○ Existing	
Institutional Buildings:		
○ Educational Facilities	○ New or ○ Existing	
○ Other Institutional	○ New or ○ Existing	
● Health Care Facilities	○ New or ● Existing	
○ Industrial Facilities or Processes	○ New or ○ Existing	
○ Public Assembly	○ New or ○ Existing	
○ Residential (Single and Multi-Family)		

2. Name of building or project: Anne and Robert Lurie Children's Hospital of Chicago

City/State: Chicago,IL

3. Project Description: Retro-Commissioning

Project Study/Design Period: 02/2014 (Begin date (mm/yyyy)) to 03/2015 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%

4. Entrant (ASHRAE member with significant role in project):

a. Name: Bibby (Last) Chris (First) (Middle)

Membership Number: 8234133

Chapter: Illinois

Region: VI

b. Address (including country): 333 North Michigan Avenue

Chicago (City) IL (State) 60601 (Zip) USA (Country)

c. Telephone: (O) 312-899-1000 d. Email: cbibby@siebenenergy.com

e. Member's Role in Project: Project Lead

f. Member's Signature: Chris Bibby

Digitally signed by Chris Bibby
DN: cn=Chris Bibby, o, ou, email=cbibby@siebenenergy.com, c=US
Date: 2015.10.09 16:47:08 -05'00'

5. Engineer of Record: Christopher Bibby P.E.

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.

Ann & Robert H. Lurie Children's Hospital of Chicago™

Retro-Commissioning

ASHRAE Chapter Technology Award Narrative

Facility Description: Ann & Robert H. Lurie Children's Hospital of Chicago is a 23-story, 1.25 million-square-foot, multi-specialty pediatric healthcare facility that opened in 2012. The hospital consumes electricity and natural gas and has one basement level below grade.

Project Scope: Retro-commissioning of the hospital was completed in March 2015 under the guidelines of the ComEd Smart Ideas for Your Business incentive program. The primary goal is to reduce electricity and natural gas consumption and expenses by identifying and implementing low-cost, rapid-payback energy efficiency measures.

Project Cost: $30,720
Project Savings: $174,228
Simple Payback: 0.18 Years

Facility System Description

- All mechanical equipment has full DDC controls with a Metasys building automation system from Johnsons Control Inc.
- Twenty-nine air handling units (AHUs) supply ventilation air and cooling. Cumulative AHU supply air volume is 1.4 million cfm.
- The central steam heating plant consists of four 800 HP scotch type boilers that maintain a working pressure of 125 psig. The boilers are equipped with stack economizers.
- Chilled water is generated from six 1,350-ton centrifugal chillers located in the penthouse mechanical space. Chilled water is available 24/7/365 for both space conditioning and process cooling loads.

The Retro-Commissioning Project

Although Lurie Children's Hospital was LEED-certified new construction and had been open less than two years, the building owner understood that the hospital's energy performance could be improved if the opportunities were uncovered and executed effectively. The owner sought an energy optimization expert to recommend ways to reduce energy use and cost. Sieben Energy Associates (SEA) served as energy efficiency consultant to the hospital's facility operations staff in a truly collaborative effort. By the end of the project, the team achieved verified annual electricity savings of 1,500,000 kWh and natural gas savings of 150,000 therms.

The project began with planning and investigation, during which SEA identified thirteen (13) retro-commissioning measures (RCMs) with a savings potential of 2.2 million kWh. Hospital staff elected to implement nine (9) of the RCMs as part of the project.

The majority of energy savings resulted from a single zone rescheduling RCM that involved modifications to the conditioning of certain spaces during regular unoccupied hours. Those spaces had to be identified first. The team surveyed staff in all areas of the hospital; this process included interviews with all department managers and additional occupants.

As a result of the survey, SEA discovered that approximately 40% of the total conditioned square footage had been designed for 24/7 operations but in reality exhibited a predictable schedule of occupied and unoccupied hours. Once area schedules were identified, the 1,000-plus terminal units were organized into eight different schedule groups and programmed individually to transition to unoccupied mode at the appropriate times.

To fully capture the savings potential of the measure, the space scheduling was paired with an innovative ventilation rate reset program that allowed the central air-handling units to adapt dynamically to changes in space occupancy. The measure produced a significant reduction in energy consumption for heating as well as a consistent reduction in AHU fan power during off-peak hours. This measure, although simple in theory, is actually quite complex in practice, because of the unique characteristics of this extremely busy hospital. This particular RCM would not have resulted in such dramatic savings without the dedicated effort of the hospital's facility operations staff. The $91,000 in annual energy cost savings from this single measure demonstrates the enormous potential of retro-commissioning when building staff and energy consultants work closely and cooperatively throughout the project.

The remainder of the project savings resulted from the implementation of eight additional RCMs, including:

- Tuning of existing temperature control loops.
- Static pressure and chilled water reset programs.
- Enthalpy economizer control.
- Optimization of chiller sequencing and pump controls.

In addition to the nine RCMs, SEA identified several capital measures, including installation of variable frequency drives, demand-based exhaust fan control, lighting upgrades, and the installation of a winter heat exchanger to take advantage of free cooling in the building process cooling loop. The hospital has already begun implementing some of these capital measures—with a winter heat exchanger to come online in 2016. These capital measures will produce significant additional energy savings. Since SEA's professional services fees were paid by ComEd, the hospital was able to prioritize its limited capital funds to implement the RCMs and capital measures.

Application of ASHRAE Technology Award Criteria

1. **Energy Efficiency:** The primary goal of the project was to identify energy efficiency measures. All identified and verified measures represent opportunities to improve mechanical system efficiency at the facility.
2. **Indoor Air Quality:** The measures implemented were all in compliance with ASHRAE 62.1.
3. **Innovations:** Typical retro-commissioning concepts and measures are now well established, but the identification of opportunities within an existing building, and customization of measure control sequences, present challenges that are unique to the project. The zone scheduling measure is a perfect example of this challenge: Although reducing flow rates and temperatures in rooms that are unoccupied is common practice in office facilities, it is extremely rare in healthcare facilities, due to significant organizational hurdles that accompany the traditional retro-commissioning approach. Furthermore, this project demonstrated the importance and value of retro-commissioning a facility that is essentially brand new; even a well-designed hospital open less than two years is a great candidate for energy optimization.
4. **Operation and Maintenance:** The project resulted in several modifications to the existing O&M practices that will help ensure that energy savings persist.
5. **Cost Effectiveness:** Retro-commissioning projects funded by ComEd are required to deliver cost-effective results. The project's simple payback of 0.18 years on an investment of $30,000 demonstrates the strong financial benefit of ComEd's incentive program.
6. **Environmental Impact:** The nine measures yielded a 6% reduction in the hospital's carbon footprint.

Verified Energy Savings from All Nine Implemented Retro-Commissioning Measures

RCM No.	Measure Description	Peak Demand Savings (kW/mo)	Electricity Savings (kWh/yr)	Electricity Cost Savings ($/yr)	Natural Gas Savings (therm/yr)	Natural Gas Cost Savings ($/yr)	Implementation Cost ($)	Simple Payback (yr)
1	Zone Scheduling	0.0	848,597	$42,116	74,627	$49,567	$1,594	0.02
2	Static Pressure Reset	0.0	57,724	$2,865	0	$0	$11,658	4.07
3	Reduce Air Change Rates in Operating Rooms	27.0	141,268	$7,011	22,480	$14,931	$1,594	0.07
4	Implement Differential Enthalpy Economizer	0.0	130,435	$6,473	0	$0	$1,594	0.25
5	Implement Chilled Water Temperature Reset	0.0	85,796	$4,258	0	$0	$1,594	0.37
6	Optimize Chiller Sequencing	0.0	55,966	$2,778	0	$0	$2,641	0.95
7	Optimize Condenser Water Pump	5.0	120,259	$5,968	0	$0	$2,641	0.44
8	Optimize MAT Control	0.0	0	$0	53,821	$35,748	$2,557	0.07
9	Optimize IDF Chilled Water Pump	0.0	50,614	$2,512	0	$0	$2,050	0.82
Verified Totals		**32**	**1,490,659**	**$73,982**	**150,928**	**$100,246**	**$30,720**	**0.18**